

Lab 2 - Solubility of CO₂ and Water Temperature Lab

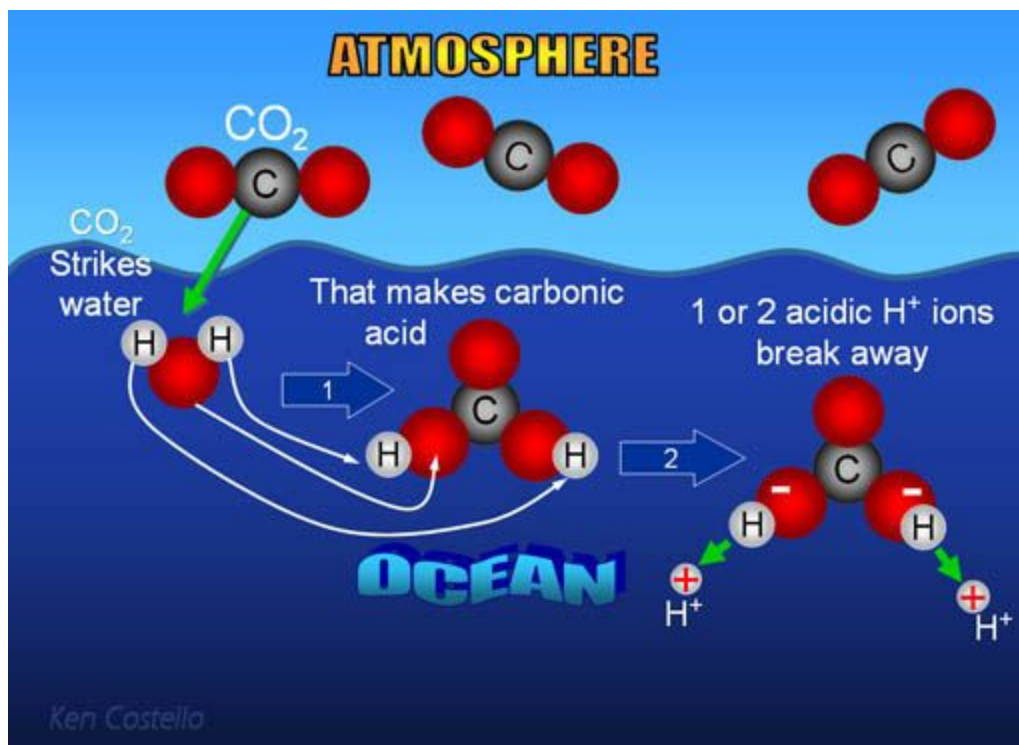


Image: chemistryland.com

Solubility of a gas in water is the measure of how much of the gas is dissolved in the water. Carbon dioxide is a gas that can dissolve in water and it goes through several different chemical reactions (see diagram above). Oxygen is another gas that is soluble in water. This is important to most living things that depend on oxygen in the water to “breathe in” and make ATP’s for their cellular functions.

This lab is going to look at the effect of water temperature on the solubility of CO₂ gas. Alka-Seltzer tablets are the source of CO₂ - they release CO₂ when reacted with water.

Your teacher will demonstrate the quantitative method for determining the volume of gas that is released from the water* (remember the solubility of gas is how much of the gas is *dissolved* in the water).

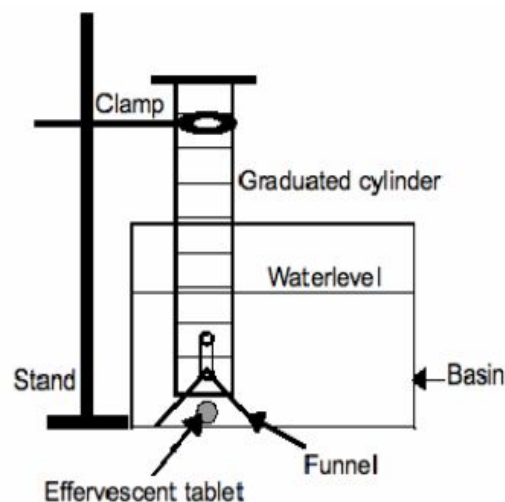
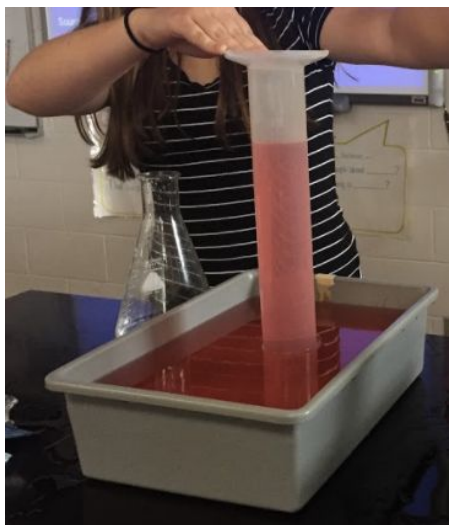


Figure 1. Experimental Set-up



Remember that you will need to fully fill the graduated cylinder with water and then cover the top with a Petri dish and then put it upside down in the basin of water. Carefully remove the Petri dish. You will need to then put the Alka-Seltzer tablet under a funnel positioned under the graduated cylinder when you are ready to start your experiment. The volume of gas (in mL) that is released from the water will displace the water in the graduated cylinder and can be measured quantitatively.

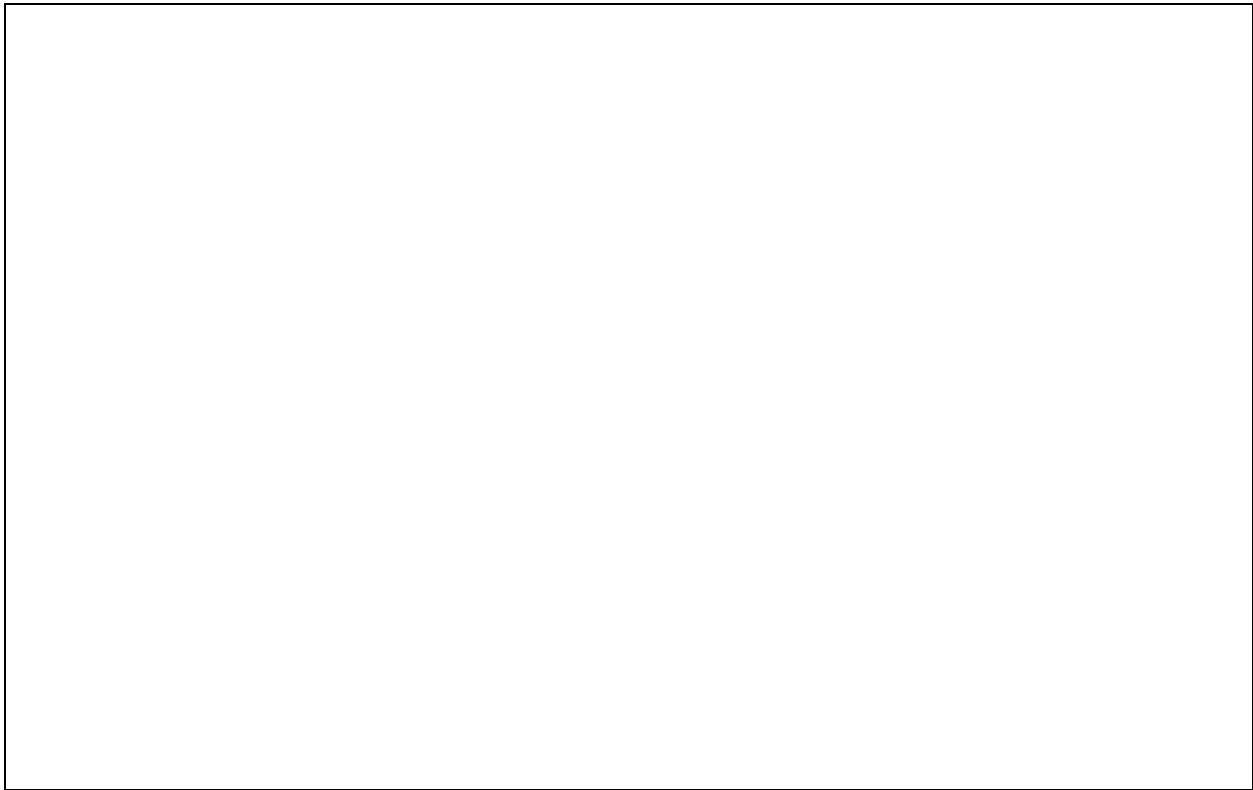
Materials

500 mL graduated cylinder
Clamp
Petri dish
Funnel
Basin
Ring Stand
Temperature probe (or thermometer)
Ice and hot plates
Alka-Seltzer tablets

State your Experimental Question

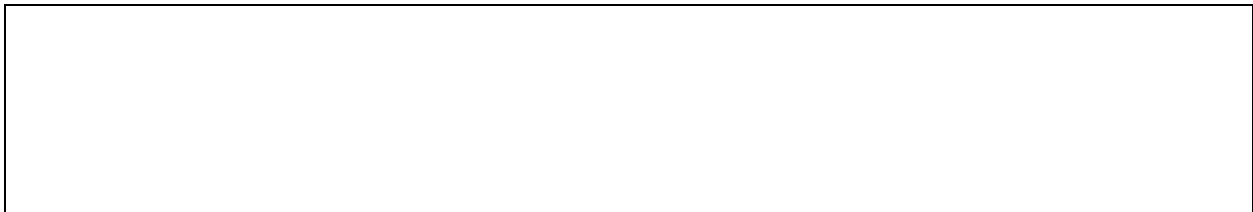
State your Hypothesis

After you 3 trials, create a bar graph in Google spreadsheets to show the results of your experiment. Make sure you have an appropriate title on your graph as well as labeling your axis. Graph and Insert it below:



Analysis Questions

1. What is the effect of water temperature on the solubility of CO₂ gas? Did your experimental data support your hypothesis? Explain.



2. Climate change will not only produce a warmer world, but a warmer ocean as well. Predict the effect of a warmer ocean on atmospheric levels of CO₂ and explain based on the results of your experiment. Use the term “solubility” in your answer.



3. What world oceans would you expect to uptake more atmospheric CO₂? Where in the world's oceans would you expect to uptake less CO₂. Explain

4. What were some errors in your experiment? List 3.

5. If you had a chance to experiment more with this setup, what experiment would you do? For example, what do you think would happen if you dissolved 2 Alka-Seltzer tablets one right after another?

6. Looking at the diagram of the oceans and CO₂ at the beginning of this lab, predict what would happen to the pH of the ocean if more CO₂ was dissolved in the ocean waters. Explain.

Enrichment

Watch this 3 min video on [How Carbon Dioxide Kills Ocean Life](#)

What are 5 things that you learned from watching this video?

- 1.
- 2.
- 3.
- 4.
- 5.

Complete this 3 min EDPuzzle quiz using the following link - click [HERE](#)

This lab was edited to be a guided inquiry lab by Leigh Foy 2016 but developed for CarboSchools by S. Soria-Dengg, IFM-GEOMAR, Kiel, Germany. Mail: sdengg@ifm-geomar.de
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